

Drainage History of a Part of the
Hocking River Valley

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Ohio Academy of Science Field Trip Guide

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Introduction

This field trip is to cover the drainage history of the Hocking Valley from Teays drainage to the present. The first two stops will consider the Teays drainage and subsequent changes within Athens County. The remainder of the day will be devoted to the Pleistocene drainage history of the Hocking Valley.

Almost the whole of Athens County is drained by the Hocking River and its tributaries, although Shade River, Raccoon Creek, Leading Creek, a tributary of the Muskingum River and a few other stream systems drain minor portions of Athens County. The Hocking River heads northwest of Lancaster and flows southeast through the center of Athens County to the Ohio River, which it joins in the southeast corner of the county. The Hocking River tributaries form in general a dendritic drainage pattern, but a careful examination reveals many complications and peculiarities in the drainage. Several factors are responsible for these irregularities. 1) Because the bedrock dips an average of 30 feet per mile to the southeast, north-south stream systems are asymmetrical, with longer and better developed tributaries to the west than to the east. Perhaps the most striking example is Snow Creek, a tributary of Monday Creek, along the northwest edge of the county. See Figure 4. The same asymmetry on a larger scale but not so extreme affects Sunday Creek, one of the major tributaries in the county. 2) The shifting of drainage divides by headward erosion has caused stream piracy, leaving barbed tributaries flowing into the captured part of the stream. Brill Creek and Big Creek, Federal Creek tributaries in the northeast part of the map, are among the numerous examples of streams with barbed tributaries. 3) The present drainage of southeast Ohio is quite recent, the result of complex drainage changes of the Pleistocene. Athens County drainage differs markedly from the preglacial Teays drainage. The Hocking River, which flows southeast, trends almost at right angles to the grain of the Teays tributaries of Athens County. Nevertheless the modern streams are affected by the Teays drainage. The Hocking River itself consists of segments of preglacial tributaries. Sunday Creek and Margaret Creek, Hocking River tributaries, follow very closely their Teays ancestor, Chauncey Creek. Some modern streams follow Teays valleys for a distance and then cut across a preglacial divide into another Teays valley. Some Teays valleys are followed by several streams, which enter from the side, flow a short distance along the valley, and then leave.

The Teays River, the main preglacial river of southeastern Ohio, did not flow through Athens County. However, two of its northern tributaries, Marietta River and Albany River, flowed south across the county. See Figure 3. The Albany River and its tributaries drained the western part of the county; the Marietta River the eastern part. The two main headwaters of the Albany River were Chauncey Creek to the east and Luhrig Creek to the west. The two joined in the northwest corner of Alexander Township at Fisher and flowed southwest across Alexander and Lee Townships. The Albany River floodplain is particularly well preserved along the flatland in and near Albany. The larger river, the Marietta River, actually flowed through only Troy Township in Athens County. However, most of Athens County was drained by the numerous, well developed tributaries of the Marietta River, including School Mill, Beebe, Canaan, New England and others.

Because the Teays River flowed northwest across Ohio through the glaciated part of the state, it is generally accepted that the Teays drainage was destroyed by the first invasion of glaciers into Ohio, although Rhodehamel and Carlston (1963) believe that some of the Teays drainage in West Virginia was diverted in preglacial times. The invasion of the glacier ponded the stream to form long "finger" lakes in which lacustrine silts and clays accumulated.

The disruption of the drainage by the arrival of the first glacier established the Deep Stage drainage, named for its deeper valleys which were eroded well below the Teays level. Deep Stage drainage is not well known in Athens County, but the thick fill of gravel below the present level of the Hocking Valley is cited as evidence of deep pre-Illinoian erosion. Stout and others (1943) indicate that by Deep Stage drainage the southwest flowing Teays tributaries had been diverted to the southeast along the course of the present lower Hocking River as Stewart Creek with its headwaters near Haydenville. The time and mechanism of this drainage change are by no means certain. It is possible that a series of stream piracys starting with headward erosion at the mouth of the present Hocking River diverted the drainage to the southeast. Alluviation, which reduced the gradients along the old Teays tributaries, and the steeper gradient afforded by the more direct route to the southeast could have facilitated these changes. The stream captures may have occurred after the major stream had incised itself to the low level of the Deep Stage but before the smaller tributaries were able to intrench themselves deeply into their alluviated valleys.

The Illinoian glaciers (The earliest clearly recorded in this part of the state) advanced farther down the Hocking Valley than any others known, but not into the area covered by this field trip. The exact position to which it advanced has been disputed. The flood of meltwater which poured down the Hocking River carried a vast load of sand and gravel which filled the valley to a depth of nearly 300 feet near the glacial margin and from 90 to more than 100 feet farther downstream. Of the many probable Illinoian advances, two are recorded within the Hocking Valley as irregular valley train terraces from a few miles southeast of Lancaster to almost the Ohio River. In the upper part of the valley, near the glacier margin, the two terraces slope rather steeply downvalley and are clearly distinguishable by a marked difference in elevation. Farther down valley the terrace gradients become much more difficult to distinguish.

Several rather spectacular drainage changes occurred as the Illinoian sands and gravels filled the valley. The most conspicuous occurred at Rockbridge where the river abandoned the wide valley train surface and cut a new gorge a few miles to the northeast. Also quite conspicuous is the drainage change several miles northwest of Athens, where the Hocking River chose a new path to the northeast, abandoning the part of its valley known as The Plains.

There is abundant evidence that what is now a single river flowing southeast to the Ohio River was during part of the Pleistocene two separate rivers, one flowing southeast and the other flowing northwest, separated by a divide in the vicinity of Haydenville. An advance of ice

from the northwest ponded the northwest flowing stream, causing it to spill over the divide at Haydenville and permanently reversing the flow toward the southeast. The date of this drainage change has been generally considered to be Illinoian, although there is not complete agreement on this point. The increasing evidence in neighboring areas of Kansan or older deposits, and the presence of higher and more deeply weathered patches of sand and gravel (some crystalline) along the Hocking Valley suggest that the drainage reversal may have occurred before Illinoian times.

Upon the retreat of the Illinoian glaciers, normal stream flow was established, and during the Sangamon, a deep, wide trench was eroded into the Illinoian valley train. Most of the sand and gravel was removed, leaving only isolated patches of terrace.

Only two of the many advances of the Wisconsin glaciers are represented along the Hocking Valley. The volume of sand and gravel dumped along the Hocking Valley was only a fraction of that deposited during the Illinoian and only partially filled the valley. As erosion followed both intervals of deposition, the Wisconsin valley trains, like the Illinoian, are now represented by isolated patches of terraces. The older and higher has been named the Lancaster Terrace (Kempton, 1956) from its northwesternmost exposure at Lancaster. The soils developed on these sands and gravels are so deep and well developed that the Lancaster Terrace is considered to be related to the buried "early" Wisconsin deposits, (Kempton, 1956) which have been described at many localities in the central and western parts of the state. Radiocarbon dates from wood in this "early" Wisconsin drift places the age at greater than 37,000 years (Forsyth, in Wolf, Forsyth, and Dove, 1962, p. 149). The Lancaster Terrace is best developed at the outskirts of Lancaster, but scattered remnants have been described as far southeast along the valley as several miles past Stewart.

As the "early" Wisconsin sand and gravel filled the bottom of the Hocking Valley, the tributaries were ponded, and lacustrine silts and clays collected in the lakes. The lacustrine terraces are well preserved, especially along the larger tributaries such as Federal, Margaret, and Sunday Creek.

The lowest and youngest constructional terrace, the Carroll Terrace, has been traced as patches throughout most of the Hocking Valley down valley from the city of Carroll, where the terrace grades into the kame complex just south of Carroll. The kames and the valley train were deposited by the melt water from the glacier which constructed the Johnstown moraine in Central Ohio (Kempton, 1956). These terrace remnants are at a lower elevation than and easily distinguishable from the Lancaster Terrace. Soils on these sands and gravels are shallower and quite obviously younger than those on the Lancaster Terrace deposits. Wood from the drift east of and older than the Johnstown moraine has been at 21,000+ years (Forsyth, in Wolf, Forsyth, and Dove, 1962, p. 149). The Carroll Terrace is therefore "late" Wisconsin, probably Tazewell in age. A still lower terrace has been recognized in places, but it is considered a cut terrace not directly related to glacial advances.

In conclusion the Illinoian and two Wisconsinan terraces may be differentiated by their difference in elevation and by their difference in soil development.

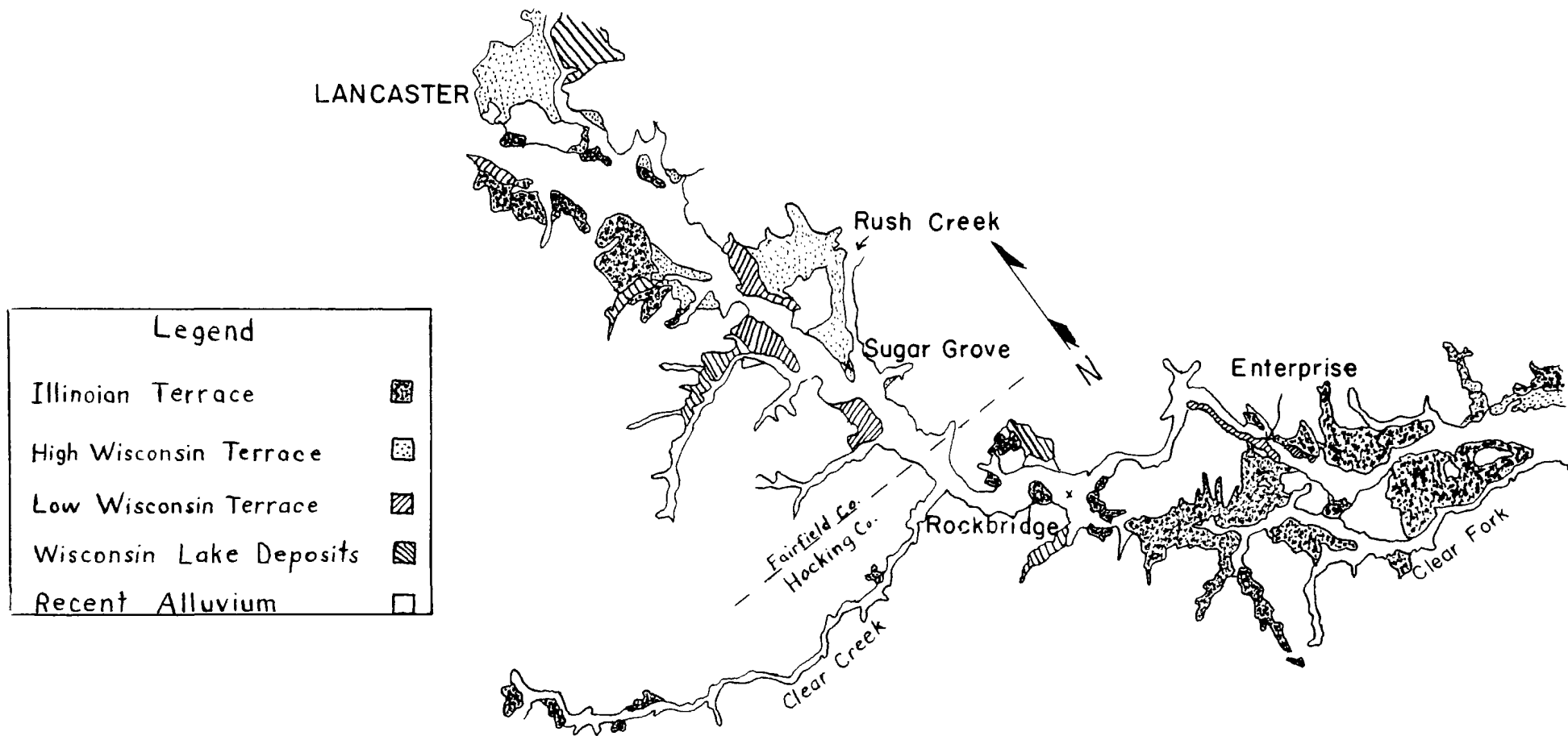


Figure 2-A

Generalized Map of Pleistocene Deposits of the Hocking Valley
(from Kempton)

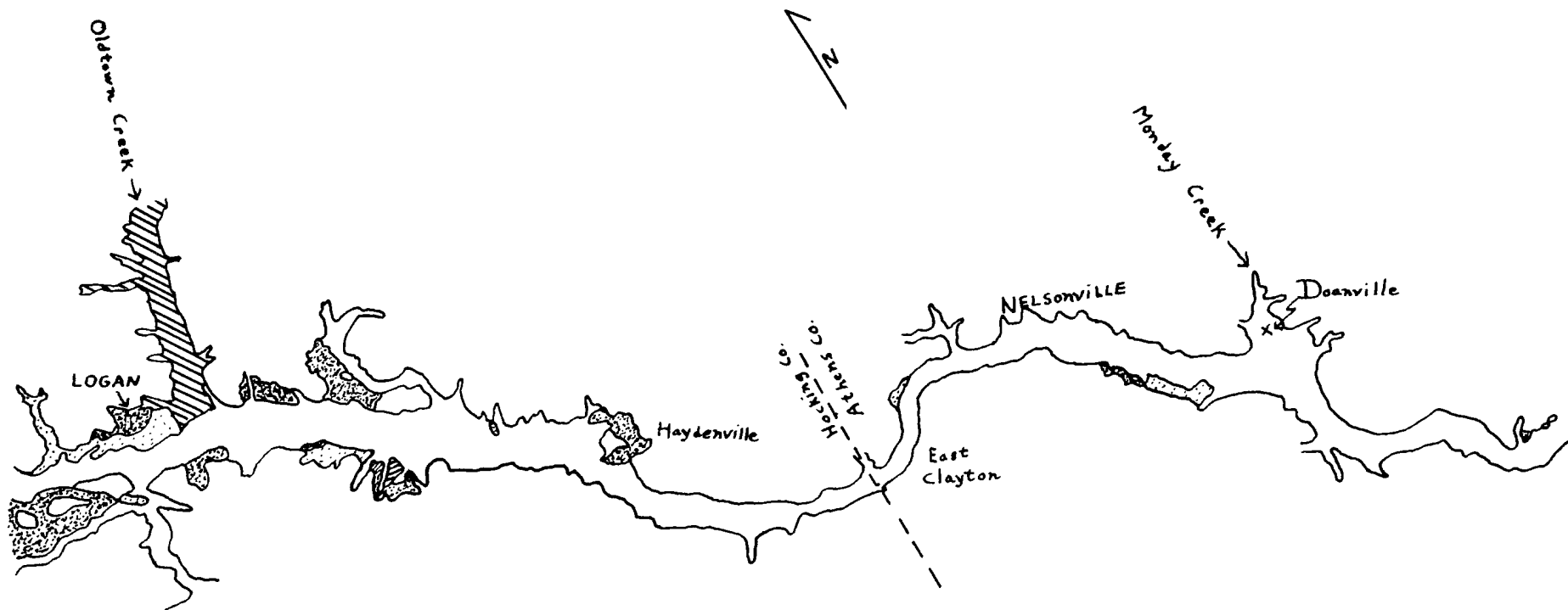


Figure 2-B
Generalized Map of Pleistocene Deposits of the Hocking Valley
(from Kempton)

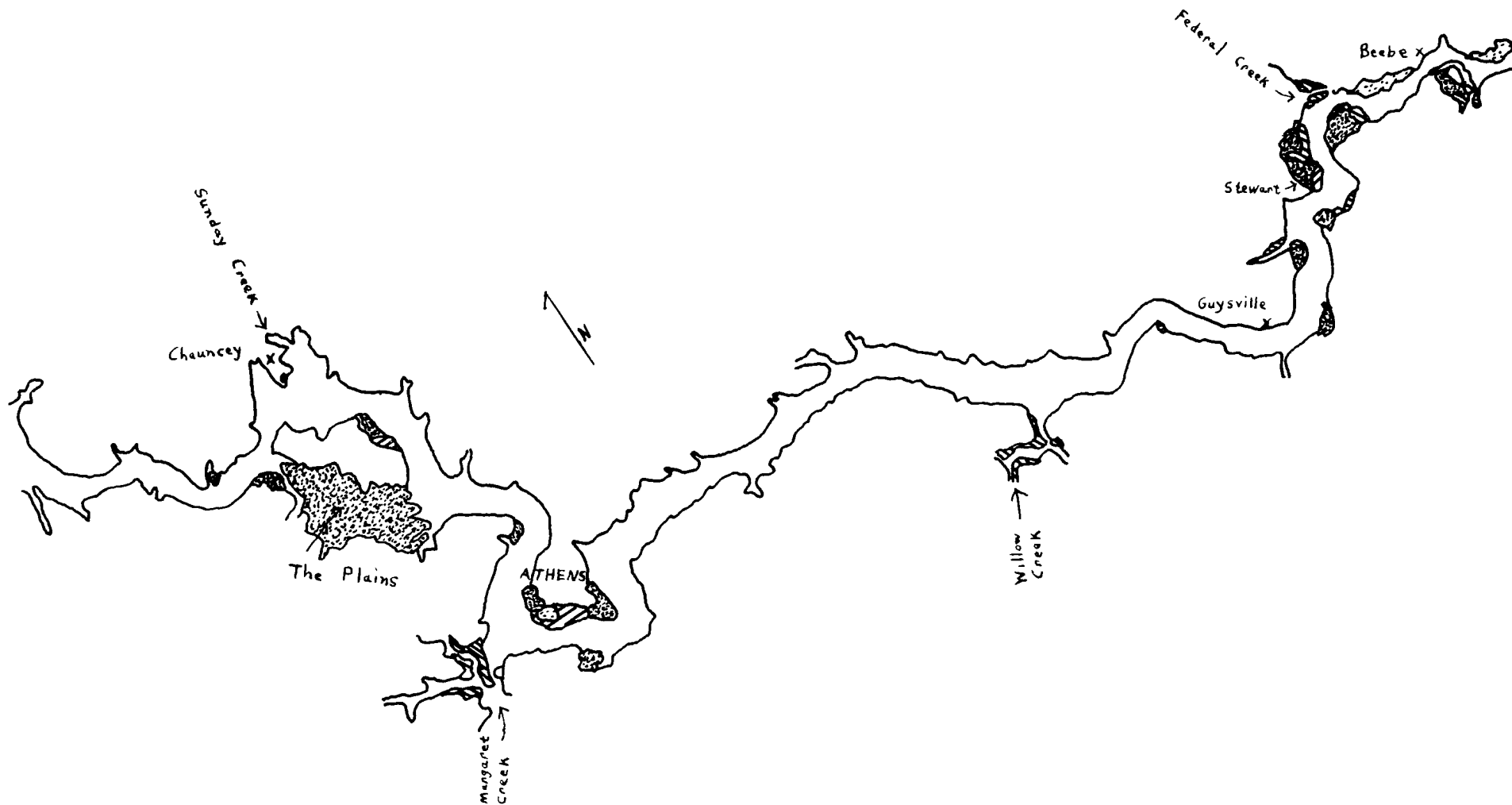
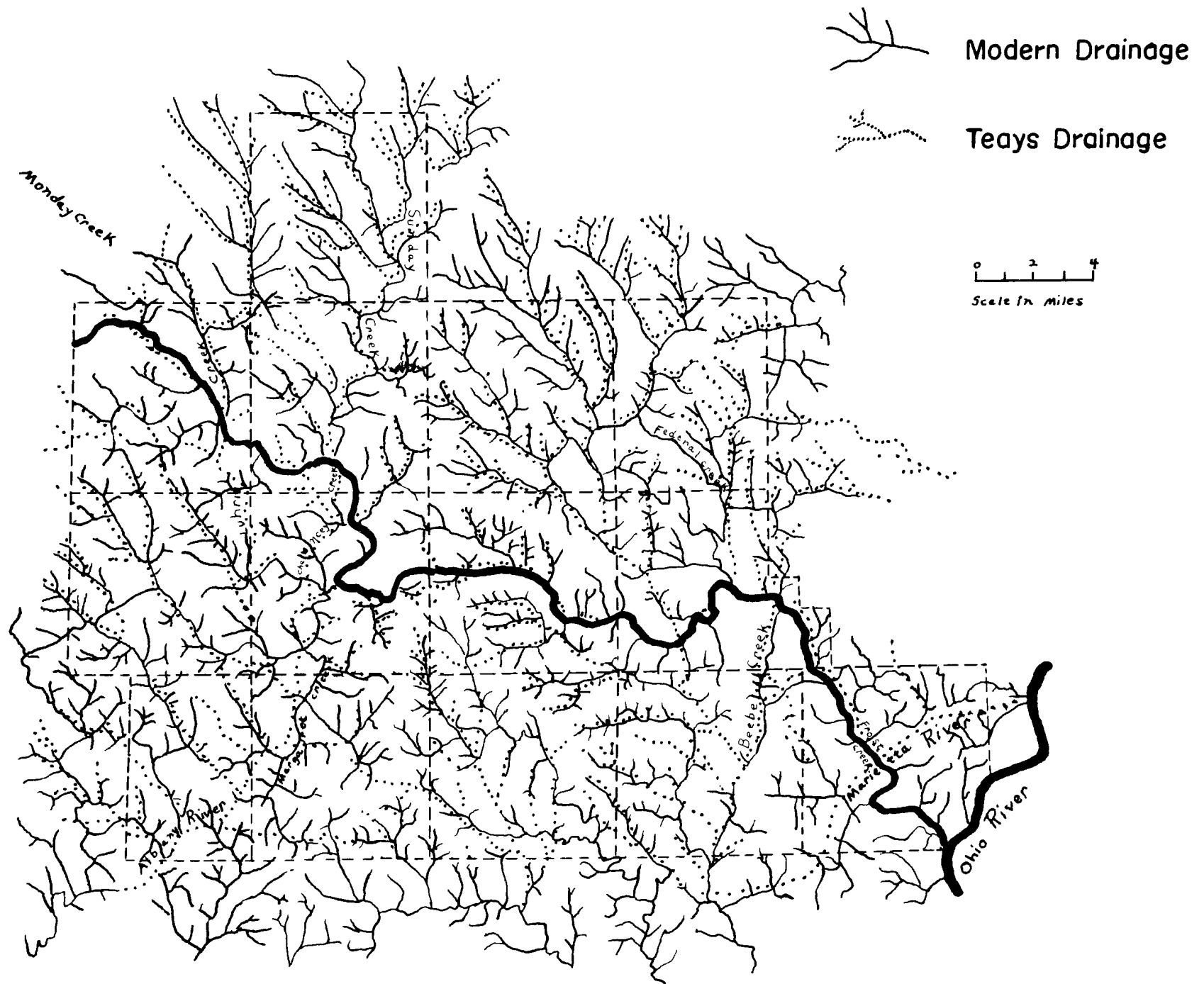


Figure 2-C

Generalized Map of Pleistocene Deposits of the Hocking Valley
(from Kempton)



Teays Drainage Superimposed On Modern Drainage, Athens County, Ohio (From Sturgeon)

Road Log

MILEAGE

- 0.0 Leave from Porter Hall. Turn left on Richland Avenue.
- 0.7 Athens State Hospital at right is built on an Illinoian outwash terrace. Richland Ave. follows Coates Run.
- 1.3 Continue right on Route 50 up hill.
- 1.5 to 1.7 Roadcut on right exposes 86 feet of the Ames, Gaysport, and Duquesne cyclothem.
- 2.6 to 2.85 Roadcut on right exposes massive Cow Run Sandstone. Note the extreme lenticularity of the channel sandstone.
- 3.5 Cross New York Central Railroad tracks and Margaret Creek.
- 4.3 Cross Athens Co. Rte. 19. Enter the old abandoned valley of Chauncey Creek, a Teays tributary which once flowed south.
- 4.75 Memory Gardens at right. This is part of the confluence of Chauncey Creek and Luhrig Creek to form Albany River.
- 5.4 Roadcut at the top of the hill. The west flank of the Albany River valley can be seen just to the left of where the highway enters the roadcut at the crest of the next hill.
- 6.4 Roadcut at the top of the hill. Albany River valley is still visible to the left of the highway ahead.
- 8.2 Turn left on Lee Township Road #7 at the outskirts of Albany.
- 8.5 STOP #1 along Lee Twp. road, just northeast of Albany. This stop is for a general orientation and introduction to the Teays drainage of Athens County. The area immediately surrounding Albany has one of the best preserved remnants of the Albany River in Athens County (See Figure 3). The flat surface in this immediate vicinity contrasts sharply with the bedrock hills rising above the surface to the east and west. To the east and south of this stop headwaters of north flowing Margaret Creek and south flowing Leading Creek have incised themselves as much as 50 feet or more below the general 770 foot level of the Albany River floodplain.

The Albany River flowed south draining the western part of Athens County. Its two principal tributaries, Luhrig Creek to the west and Chauncey Creek to the east, met in northwestern Alexander Township. Chauncey Creek is strikingly reflected in modern drainage. Sunday Creek, a northern tributary of the Hocking River, follows very closely the course of the northern end of Chauncey Creek.

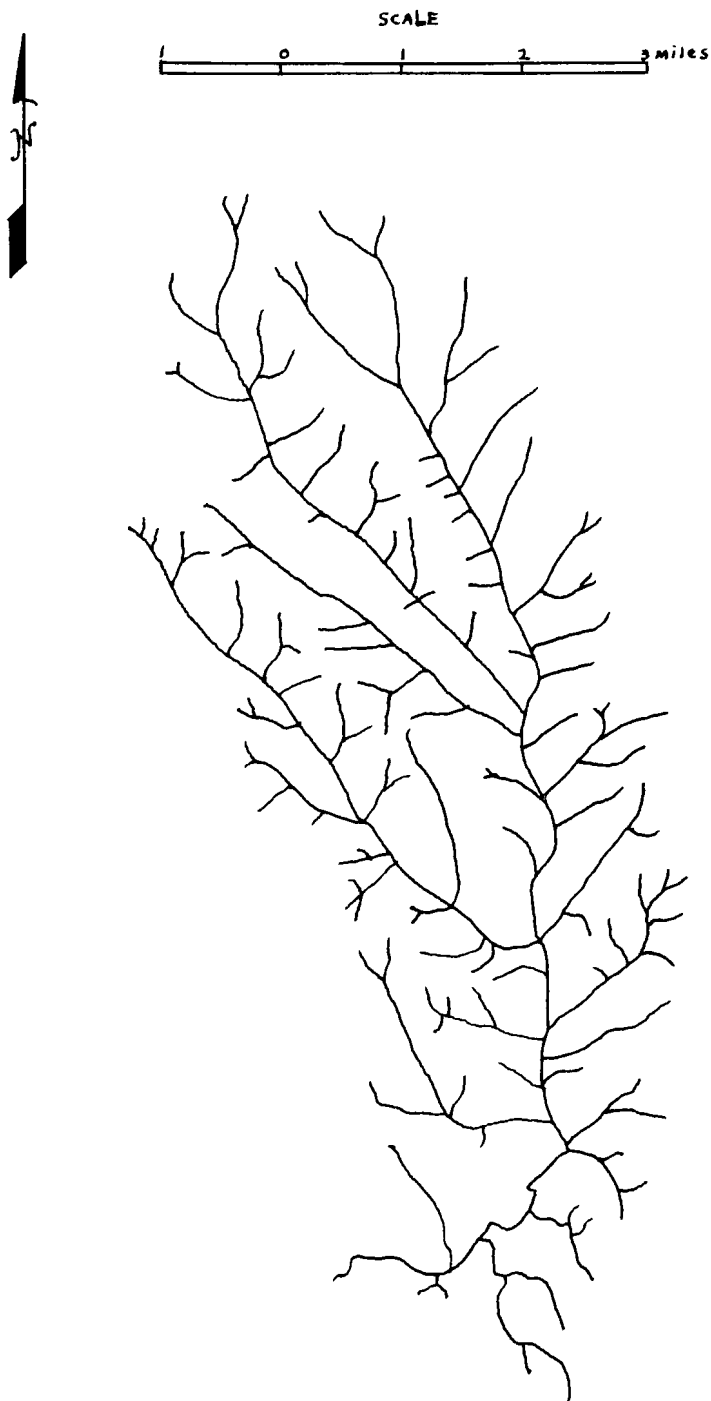
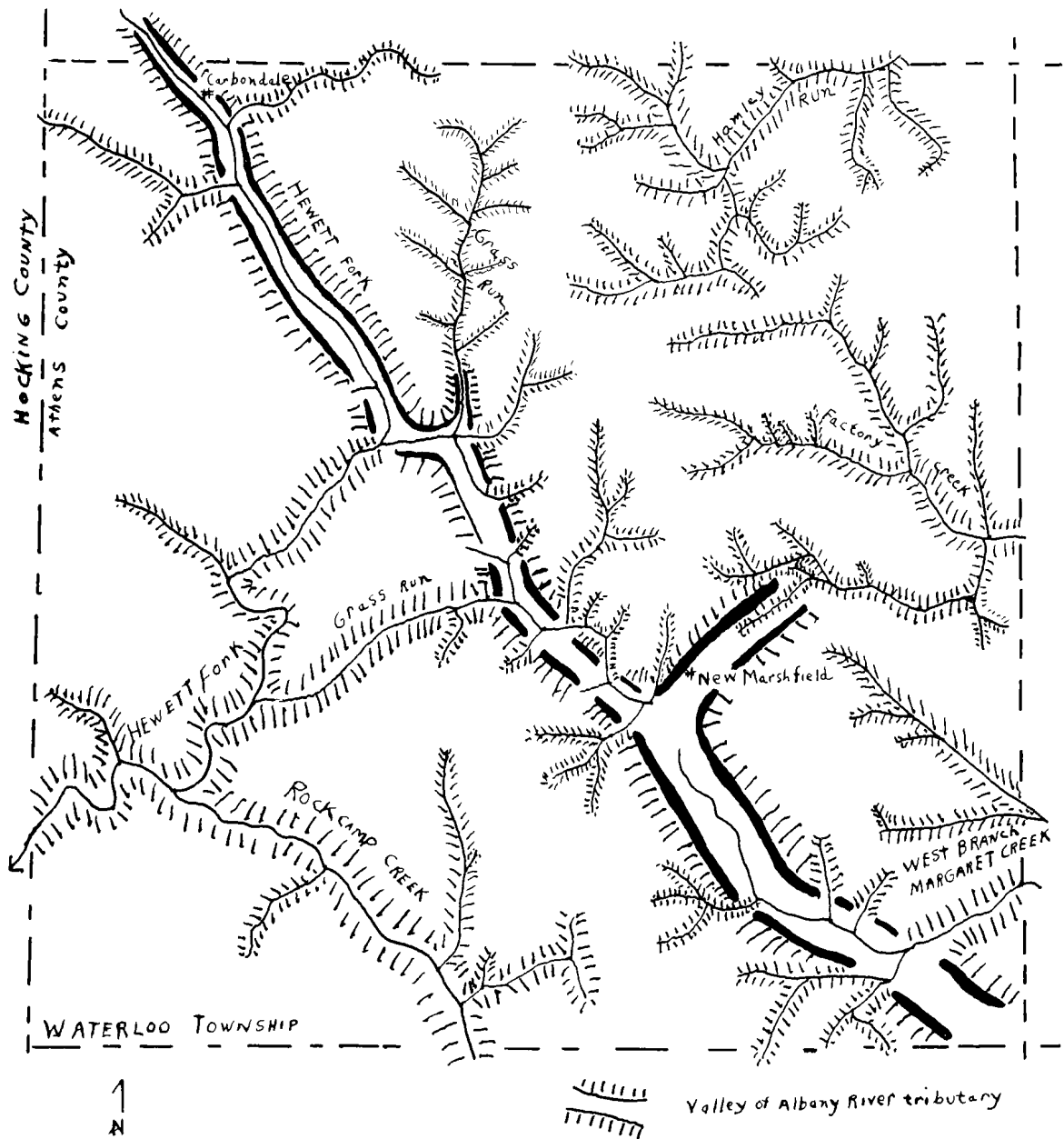


Figure 4

Snow Fork, Tributary of Monday Creek, Showing Striking Asymmetry of Tributary Development (From Sturgeon)



**Fig. 5 Map Showing Relation of Valley of Albany River (Teays)
Tributary To Modern Streams (from Sturgeon)**

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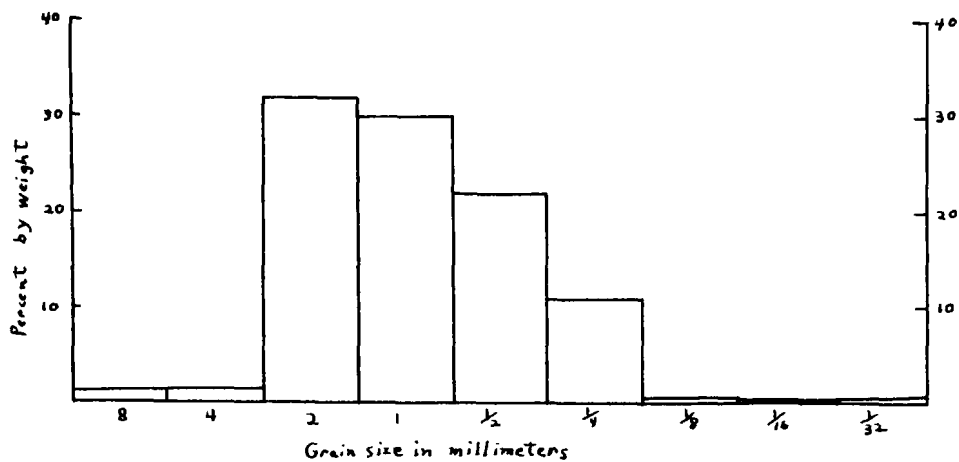
Most Sunday Creek tributaries follow closely the Chauncey Creek tributaries, but in a few places, drainage changes have resulted in local rectangular drainage patterns, as along the headwaters of Bailey Creek.

Margaret Creek, north-flowing, southern tributary of the Hocking, follows the southern end of Chauncey Creek, but in the opposite direction and a bit to the east. The reversal of drainage has left many barbed tributaries, especially from the west. The streams, such as Factory Creek, Little Factory Creek, and West Branch flow southeast, oriented to join the old south-flowing Albany River.

Numerous drainage changes along other stream systems can be seen throughout Athens County. The rectangular drainage in the headwaters of Federal Creek relates to the Teays age drainage of tributaries to the Marietta River. Several complex drainage changes occurred in the western part of the county, as Raccoon Creek captured part of the western drainage of the Albany River (See Figure 5). These drainage changes will be demonstrated on topographic maps.

Some of the finest farm lands in Athens County are on the Teays surface near Albany.

- 8.6 Turn right on gravel road.
- 9.0 Turn right into Albany. Headwaters of Margaret Creek to the left have eroded well below the level of the Albany River valley.
- 9.7 Turn right onto Route 50. Return northeast toward Athens.
- 14.0 Turn left on Radford Road (Athens Co. Rte 19). The road follows the east flank of Chauncey Creek.
- 14.8 STOP #2 Roadcut at the southern edge of the valley of the West Branch of Margaret Creek. The road follows the east flank of Chauncey Creek, whose valley averages about one-half mile in width but is quite variable. Margaret Creek is a short distance to the east of it. Several major tributaries of Margaret Creek, such as the West Branch of Margaret Creek and Factory Creek, and many smaller tributaries and gulleys have thoroughly dissected the old Chauncey Creek valley, cutting as much as 150 feet below the Teays level. The alluvial deposits are exposed along the tops of some of the smaller hills, with only occasionally the original thickness preserved. Where the streams have cut deep valleys with steep walls, bedrock is exposed. In many places the Teays sediments have crept downhill to mantle the bedrock at elevations lower than the original. Teays sediments are rather poorly exposed at this stop. Nowhere near the full thickness (more than 40 feet) is visible. The ponding of the Teays system apparently

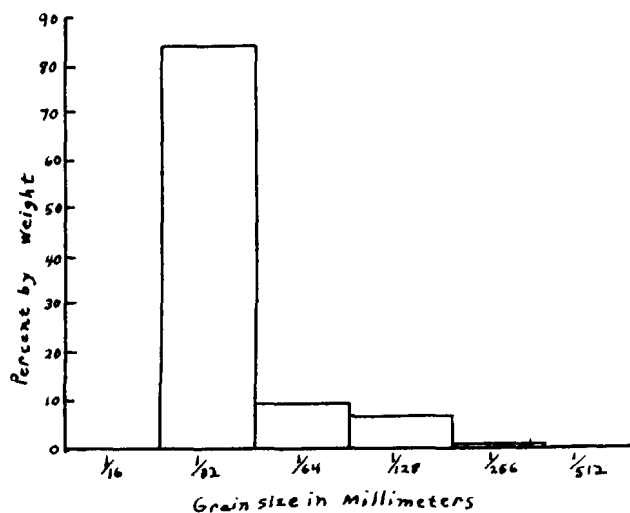


Size Analysis of Illinoian Terrace - Slater Sand & Gravel Pit

Sieve Analysis



Pipette Analysis



Size Analysis of Teays Sediments - Baptist Church

Fig. 6

MILEAGE

did not extend this far up the tributaries. The sediments show none of the laminations distinctive of the Minford silts and seem primarily to be floodplain deposits. The greater than normal thickness is probably the result of alluviation caused by ponding of the lower reaches of the stream system and the consequent raising of base level.

Size analyses run on ten samples from this stretch of the Albany River show a very distinct uniformity in texture. Most of the samples fall in the fine sand to silt range. Figure 6 is a comparison of a typical Teays sample with a sample of Illinoian outwash along the Hocking River.

About three feet of Lower Brush Creek Limestone is exposed in the ditch near the valley bottom.

- 15.1 Cross the West Branch of Margaret Creek.
- 15.3 Turn right on Baker Road and immediately leave the floodplain.
- 15.6 to 16.2 Chauncey Creek valley clearly visible to left. Deeply dissected by tributaries of Margaret Creek.
- 16.45 Turn right on Route 56.
- 17.0 Cross Margaret Creek.
- 17.1 Wisconsin lacustrine terrace to right..
- 17.3 Cross New York Central Railroad tracks.
- 17.7 Roadcut to right. White's Mill section. A landslide occurred recently. To be visited later in the day.
- 17.9 Wisconsin lacustrine terrace to left. To be visited later in the day.
- 18.1 Turn left on Route 682.
- 18.2 Cross Margaret Creek.
- 18.3 Cross Baltimore and Ohio Railroad tracks.
- 20.6 to 21.9 The Plains.
- 22.1 Turn left (northwest) onto Route 33.
- 28.7 Nelsonville city limits.
- 40.6 Logan city limits.
- 45.5 Enterprise on right below bridge.
- 46.0 STOP #3 - Extensive Illinoian terrace just north of Enterprise.

This stop is on the widest exposure of Illinoian valley train deposits, the oldest clearly recognized deposits in the Hocking Valley. The point to which the Illinoian glaciers advanced down the Hocking River is in dispute. Estimates place the edge of the ice from Clark Crossing (Forsyth in Wolf, Forsyth, and Dove) to Rockbridge (Merrill, 1953). As this field trip does not cover that area, the point is of no great importance here.

Irregularly distributed patches of Illinoian valley train deposits have been described along the Hocking Valley from just southeast of Lancaster as far downstream as Beebe.

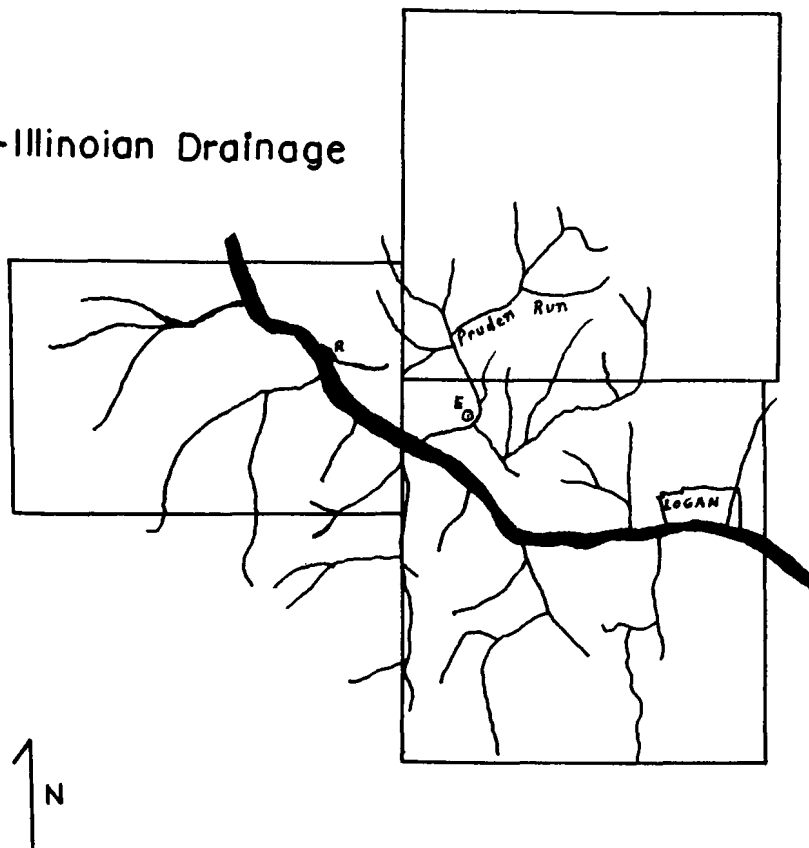
This stop is along an abandoned portion of the Illinoian drainage way. The modern Hocking flows in a narrow valley from Enterprise to Logan, in striking contrast to the wide, abandoned valley train parallel to it, one mile or more to the southwest. This original valley is now followed and is some what dissected by Clear Fork and a small, eastern tributary of Buck Run. It is apparent that the drainage change must have occurred when the drainage along the entire ancestral Hocking was to the southeast and as a result of the extensive aggradation by Illinoian melt-water laden with sediments. Such a thickness of sand and gravel was deposited that the sediment overtopped the low points along the divides between the valley and some of its tributaries and the divides between some of the tributaries. The entire area was alluviated with scattered bedrock knobs rising above the aggraded surface. The thickness of this alluvial fill is therefore very irregular. When the load of debris eventually diminished and the river began to incise itself into this depositional surface, the river by chance was following its present path along several previous tributaries. This course became permanent, and the main channel was abandoned and thereby preserved as extensive terrace remnants. Figure 7 from Merrill indicates the probable drainage changes.

Well records examined by Kempton (1956, p. 36) indicate that the alluvial fill is not entirely valley train deposits, but consists of 20 to 50 feet of gravel and sand ~~over~~ bedded silts and clays. Although the silts and clays may be Deep Stage or older, it seems most likely that they are Illinoian lacustrine sediments deposited in the ponded Lancaster River. The sand and gravel encroached over the lake deposits, as the lake became filled and drained.

During the long Sangamon interglacial interval, normal stream erosion removed all but scattered remnants of the valley fill. The terrace remnants show a well developed soil formed during the long continued weathering.

Return toward Enterprise.

Pre-Illinoian Drainage



Modern Drainage

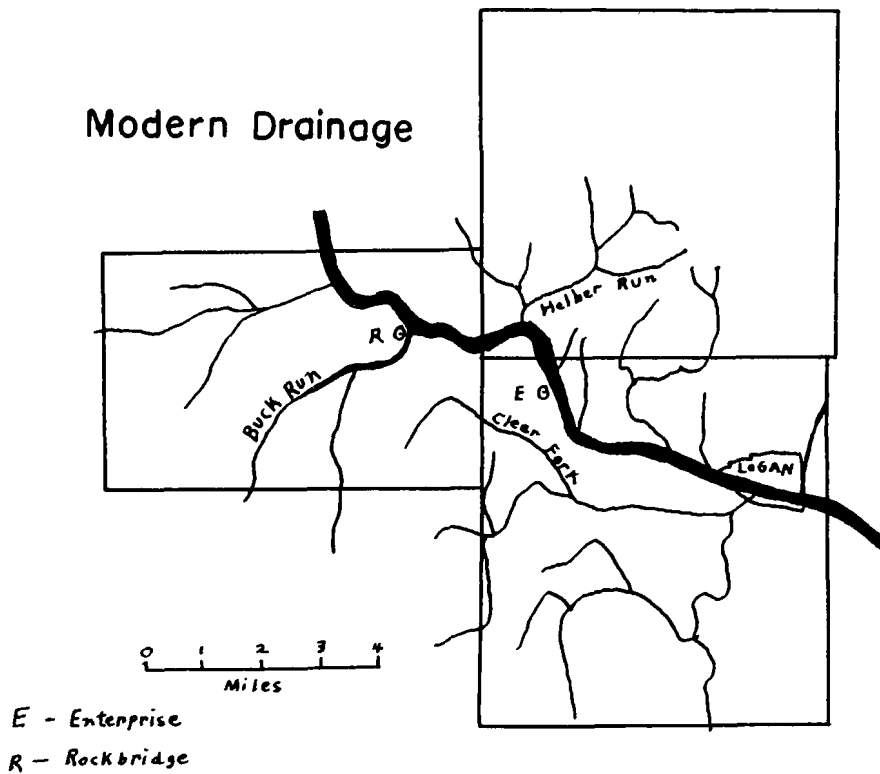


Fig.7 Illinoian Drainage Changes From Rockbridge to Logan
(From Merrill)

46.8

Cross Hocking River.

46.9

STOP #4 Abandoned gravel pit at edge of Illinoian terrace, behind Oliver farm equipment store.

This stop is to demonstrate Illinoian terrace deposits and their soils. Illinoian sediments are in general cross-bedded, relatively well sorted sands and gravels, with a cap of silt and fine sand up to 5 feet thick. The pebbles average 42% carbonates, 40% clastics, and 18% crystallines, with the carbonate percentage decreasing markedly downstream. The silt cap is generally thought to be wind deposited, though in places it is conspicuously laminated and so may be in part waterlain.

Soils are deep, reflecting the intense weathering since the end of the Illinoian. The soils in Athens County are included in the Hocking catena. On the newer Fairfield County soils map, the Negley, Pike, and Parke catenas have been described on Illinoian terraces, depending upon the thickness of the silt cover (Forsyth, p.120). The depth of leaching and oxidation average about 15 feet, though it may vary several feet in a short distance as seen in a well exposed cut. The soil color is red to red-brown on sand and gravel, but yellow-brown where the silt cap is present, with red-brown on the gravel beneath. Beneath the surface is a depth of five to eight feet. Secondary carbonates leached from above have accumulated just below the leached zone and in places have locally cemented the gravels and sands. Resistant ledges resembling bedrock can be seen in places, though not at this stop. The thick soil zone and the secondary carbonate cement make the gravel expensive to excavate and reduce its commercial value.

The following section was measured by Kempton.

	Ft.	in.
6 - yellow-brown silt	2	6
5 - Interbedded yellow-brown to red-brown fine to medium-grained sand.	1	6
4 - Interbedded yellow-brown silt and fine sand, few red-brown streaks.	2	
3 - Light brown, medium-grained sand, few decayed pebbles	2	
2 - Gravel, dark reddish-brown, clayey, with badly weathered pebbles, large boulders up to two feet in middle of zone.	8	
1 - Gravel, gray, coarse calcareous cemented zone to base.		not measured

46.9

Enter brick road across highway from gravel pit

47.1

Cross Hocking River. Low Wisconsin terrace (Carroll) visible immediately ahead on the west side of the river.

- 47.2 Climb onto Wisconsin terrace and turn right on road on east side of Cheseapeake and Ohio Railroad tracks.
- 47.8 Cross railroad tracks
- 48.6 STOP #5 Small abandoned gravel pit two miles north of Enterprise.

Park along the farm lane. Be careful not to block the public road leading to the farm house.

This gravel pit is one of only a few which expose the soil developed on the gravels and sands of the Carroll Terrace, the lower and younger of the two Wisconsin terraces along the Hocking Valley. The terminal Wisconsin moraine is at Lancaster, several miles short of the most conservative estimate of the edge of Illinoian glaciation. The two Wisconsin terraces do not nearly fill the trench eroded in the Illinoian valley train.

The younger Carroll Terrace may be distinguished from the older Lancaster Terrace by its lower elevation and its more youthful soil profile. North of Lancaster the Carroll Terrace has a surface gradient of as much as 10 feet per mile, but south of Lancaster, the gradient drops to 5 feet per mile. The soils on this terrace are Fox, deep phase, with a dark reddish-brown color. The depth of leaching and oxidation is 48 to 50 inches in the upper part of the valley, but deeper than 50 inches farther downstream. The most distinctive feature of the soil is the sharp but irregular pendant-like structure which marks the base of the B horizon.

Correlation with the Johnstown moraine establishes the Carroll terrace as "late" Wisconsin, probably correlative with the late Tazewell of Illinois.

The gravel pit at this stop displays a full, undisturbed section in only a few spots, most of the pit being disturbed by removal of the top soil. The following section was measured by Kempton.

	<u>Ft.</u>	<u>in.</u>
6 - Sand and gravel, dark reddish-brown, clay rich, non-calcareous.	3	10
5 - Sand and gravel, grey, calcareous, with oxidized, non-calcareous pendants numerous extending from zone 6	1	0
4 - Grey-brown silt and fine sand, calcareous	0	6
3 - Sand and gravel, grey, calcareous, oxidized pendants numerous, non-calcareous	1	6
2 - Silt and fine sand, grey-brown, calcareous, massive	1	10
1 - Sand and gravel, grey, calcareous, with a few large cobbles, up to two feet across, base not seen.	1 1/4	0

Return to Rte 33 by the same roads.

- 50.1 Turn left (southeast) on Rte 33.
- 50.6 to 51.4 Abandoned Illinoian terrace.
- 51.7 Enter the Hocking River floodplain. The Blackhand Member of the Cuyahoga Formation in a roadcut and cliff to the left. Erosion of this resistant rock is responsible for the characteristic cliffs and waterfalls of Hocking State Park.
- 52.4 Logan city limits
- 52.6 Turn left onto Rte 644. A right turn leads to a bridge beneath which is posed the Blackhand Sandstone. The Hocking River flows over the sandstone in rapids with the development of many potholes.
- 53.0 STOP #6 Abandoned gravel pit on the south face of the Lancaster Terrace at the northwest edge of Logan.

The Lancaster Terrace, the higher of the two Wisconsin terraces, has a gradient of 15 feet per mile near Lancaster, which decreases to 7 feet per mile downstream. In contrast to the Carroll Terrace, up to two or three feet of silt, presumably loess, blankets the terrace. The Lancaster terrace soils are distinctly more mature. Soils in Fairfield County have been mapped as deep Ockley; they are included in the Chenango catena in Athens County. The soils have a deep chocolate-brown color, are oxidized to eight feet beneath the silt cap, and are leached from 60 to 90 inches. The conspicuous pendent structure of the Carroll Terrace soils is absent. Figure 8 is a comparison of soil profiles of the two terraces.

Farther downstream, beyond Athens, the sediments become finer with lacustrine sediments interbedded with the sands and gravels. This is probably the result of the ponding of the mouth of the Hocking Valley by alluviation of the Ohio River. Fluctuation of the lake level was probably responsible for the interlayering of lacustrine and valley train deposits.

The deeper weathering of the Lancaster Terrace and its elevation above the Carroll Terrace have caused it to be correlated with the "early" Wisconsin Drift, which has been described in many exposures in central and western Ohio. Radiocarbon dates from wood fragments in the "early" Wisconsin drift place its age at greater than 37,000 years.

The soil profile at the gravel pit has been mostly covered with dirt in the construction of the new Hocking County Hospital. An exposure is still available only in the northeast corner of the pit. The following section was measured by Kempton.

	<u>Ft.</u>	<u>in.</u>
4 - Yellow-brown silt and fine sand, contains many small pebbles.	1	8
3 - Sand and gravel, oxidized dark reddish brown to chocolate brown, clay rich, many rotten pebbles, pebbles range up to ten inches.	5	2
2 - Sand and gravel, oxidized, chocolate brown, calcareous, clayey with many rotten pebbles.	3	2
1 - Sand and gravel, grey to brown, unoxidized, many rotten pebbles, calcareous, a few lenses of noncalcareous gravel present, base not seen	20±	0

Return to Rte. 33.

- 53.3 Turn left onto Rte 33 toward Logan business district.
- 53.5 Climb onto Lancaster Terrace, on which rests much of the Logan business district. A small, flat-topped Illinoian terrace remnant is visible to the left, when buildings permit.
- 54.6 Turn right on Mulberry Street (Route 93)
- 54.9 Cross Hocking River
- 54.9 STOP #7 Lunch at Kachelmacher Park.
- Return to Rte. 33
- 55.9 Leave Logan
- 56.2 Illinoian terrace to left.
- 56.7 Gravel pit of Hocking Valley Sand and Gravel Co. on left.
- 59.2 Long, narrow Lancaster Terrace remnant on left. Brick house near highway, farm buildings behind. The depth of leaching is only 50 inches. Kempton believes that the soil profile has been disturbed by an old Indian mound and by construction of farm buildings.
- 63.2 Diamond brick plant of National Fireproofing Company on left. The lower Kittanning clay and natural gas are used here.
- 63.5 STOP #8 Roadside park near Haydenville. Old Hocking Canal lock.

This stop is very near the col, the old divide between the northwest flowing Lancaster River and southeast flowing Stewart Creek of Deep Stage drainage. It is generally considered that the drainage was reversed to the southeast to form a single southeast flowing stream with the arrival of the first glacier to pond the Lancaster River. Evidence of the reversal is: 1) The presence of the col as indicated by the narrowing of the valley walls with higher,

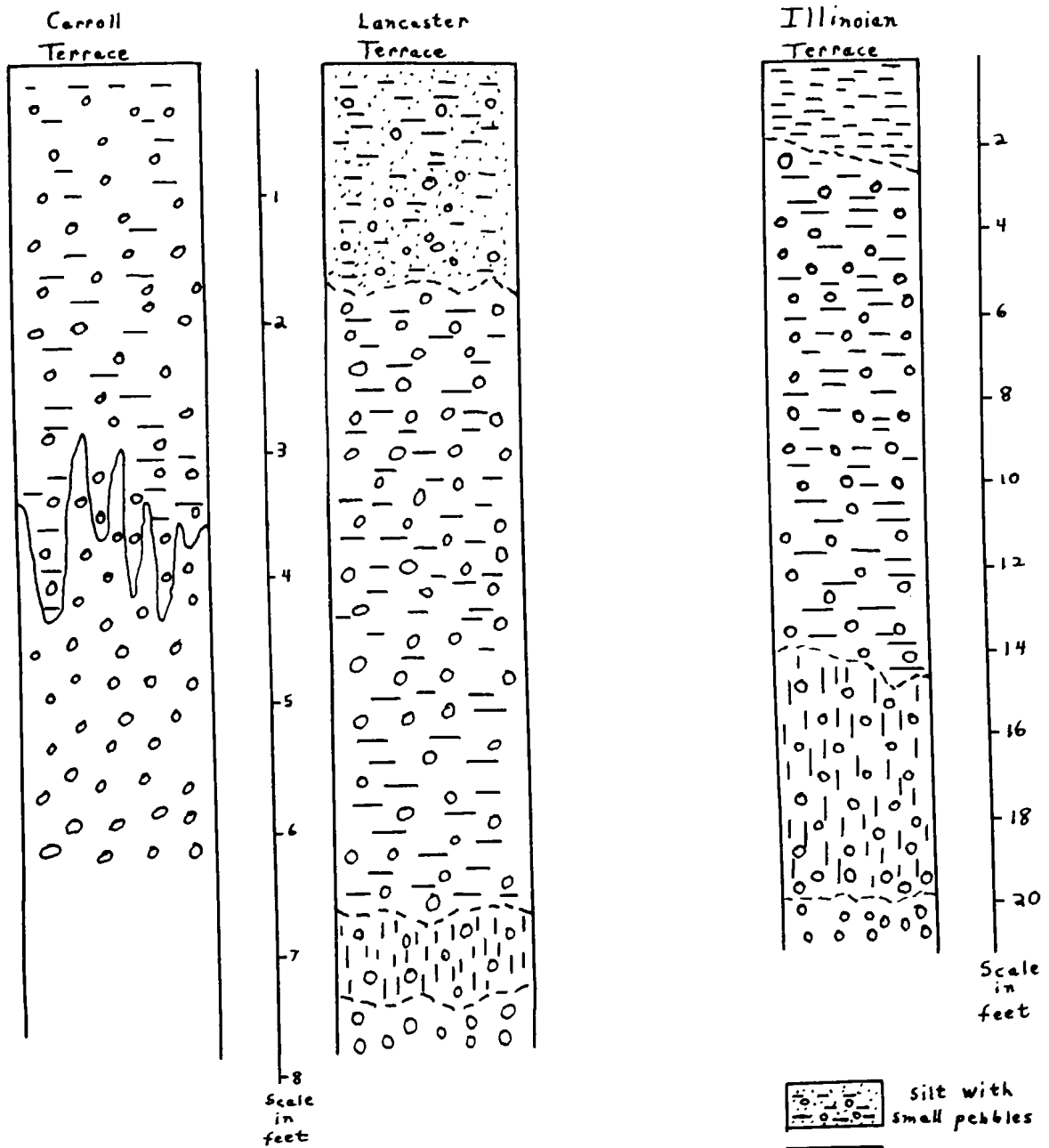
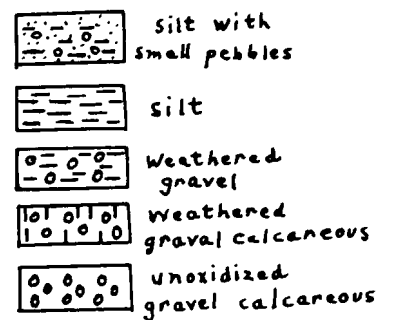


Fig. 8 Generalized Profiles of Hocking Valley Terrace Soils (From Kempton 1960)



steeper hills and narrow canyon-like valleys immediately adjacent to the col. 2) Barbed tributaries such as Scott Creek and the lower reaches of Five Mile Creek oriented as though to enter a northwest flowing river. The relationships are indicated on Figure 10, but may be seen more clearly on the topographic maps.

The date of the drainage change is considered to be Illinoian or possibly sooner. Detailed subsurface information is needed to establish the date. Kempton reports a depth to bedrock of 83 feet below the present floodplain near Haydenville. Dove has found valley fill thicknesses of up to 300 feet at Lancaster, which indicates a Deep Stage drainage to the northeast. Kempton believes that 83 feet of sediment at Haydenville may indicate more than one cycle of erosion and suggests that the reversal could be pre-Illinoian and the result of stream piracy.

64.9 Lancaster Terrace remnant on left.

66.3 Enter Nelsonville

68.3 Rte. 691 to right. Continue on Rte. 33.

69.2 Cross Cheasapeake and Ohio Railroad tracks.

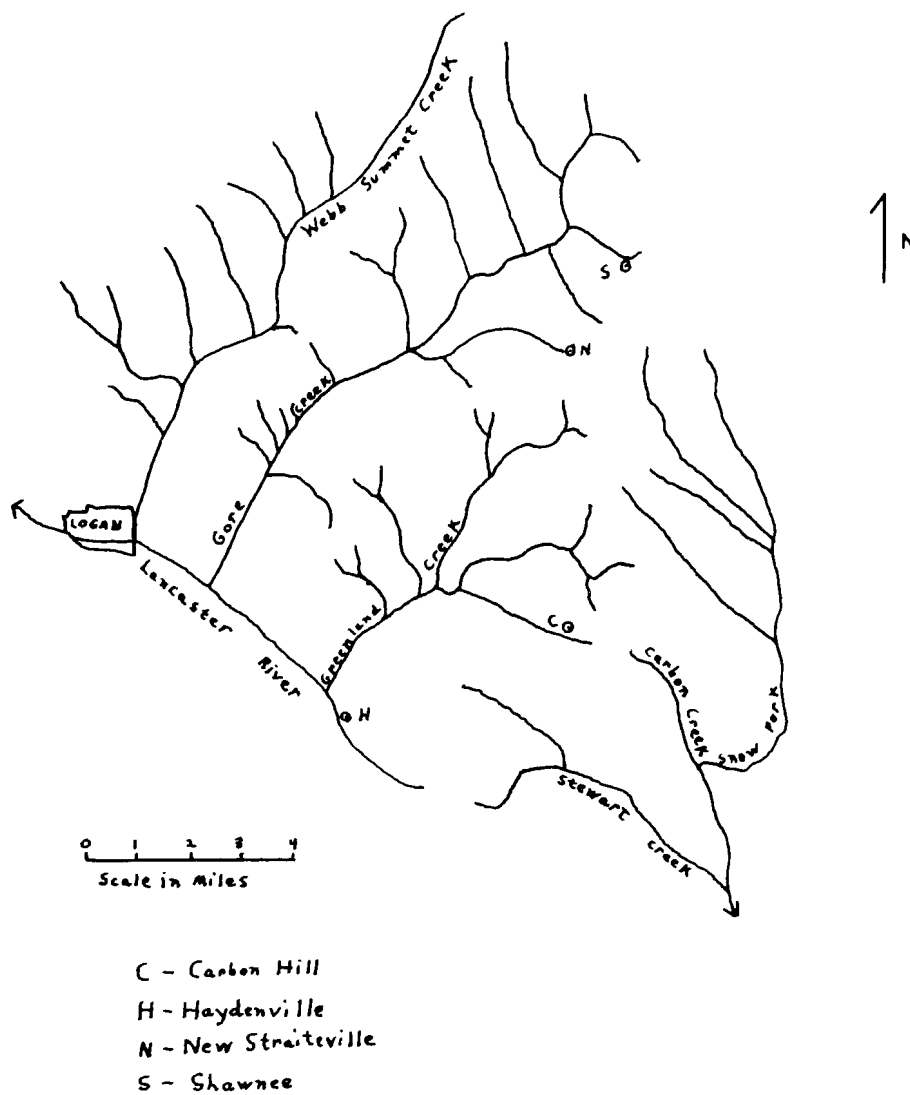
69.7 Alternate Stop - Hill of circumalluviation. An isolated bedrock knob rises above the floodplain at the confluence of the Hocking River and Monday Creek. The exact mechanism by which this formed is not certain. Perhaps during aggradation of the valley by glacial outwash a low divide separating the Hocking River from Monday Creek was overtopped by sediment. Subsequent erosion then enlarged the valley. Perhaps lateral erosion by both streams succeeded in cutting through what was already a narrow bedrock neck. The width of the valley separating the hill from the nearest valley walls indicates that the isolation of this knob must have occurred in Sangamon times or earlier.

The Middle Kittanning (#6) coal is overlain by the Lower Freeport Sandstone along the knob.

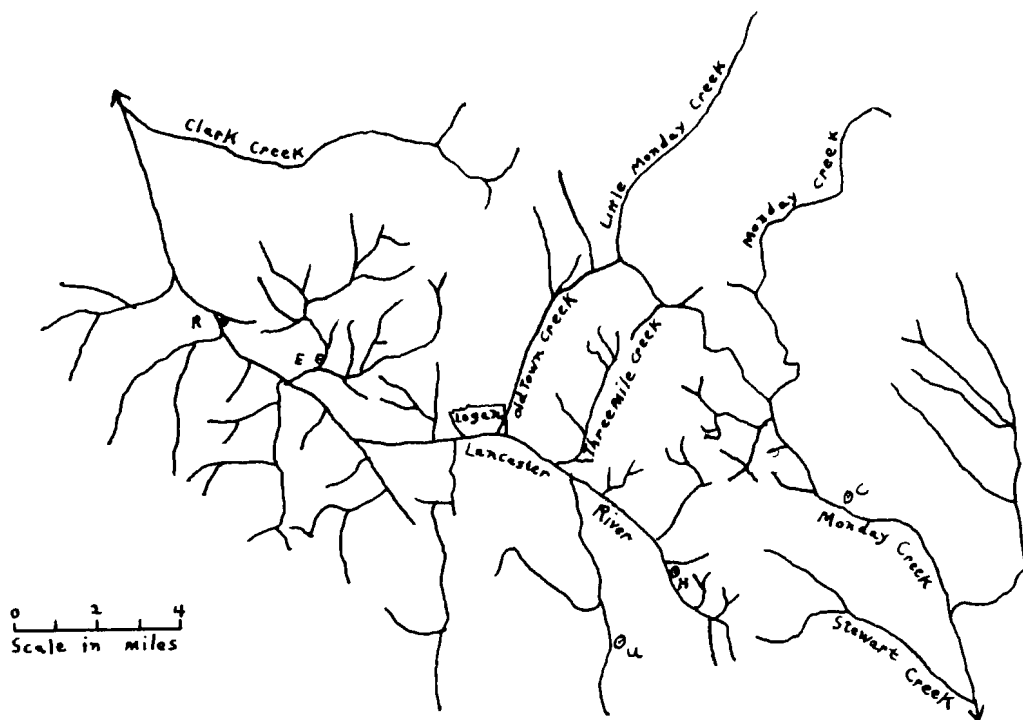
Monday Creek itself has had a complex history of drainage changes. See Figures 9 & 10. Monday Creek consists of segments of several southwest flowing Teays stage streams, tributaries of Logan River. The present stream was established by a series of stream captures starting with headward erosion by Carbon Creek at the location of the present mouth of Monday Creek. Merrill believes that the drainage changes were pre-Illinoian.

74.0 Turn right onto Rte. 682 toward the Plains.

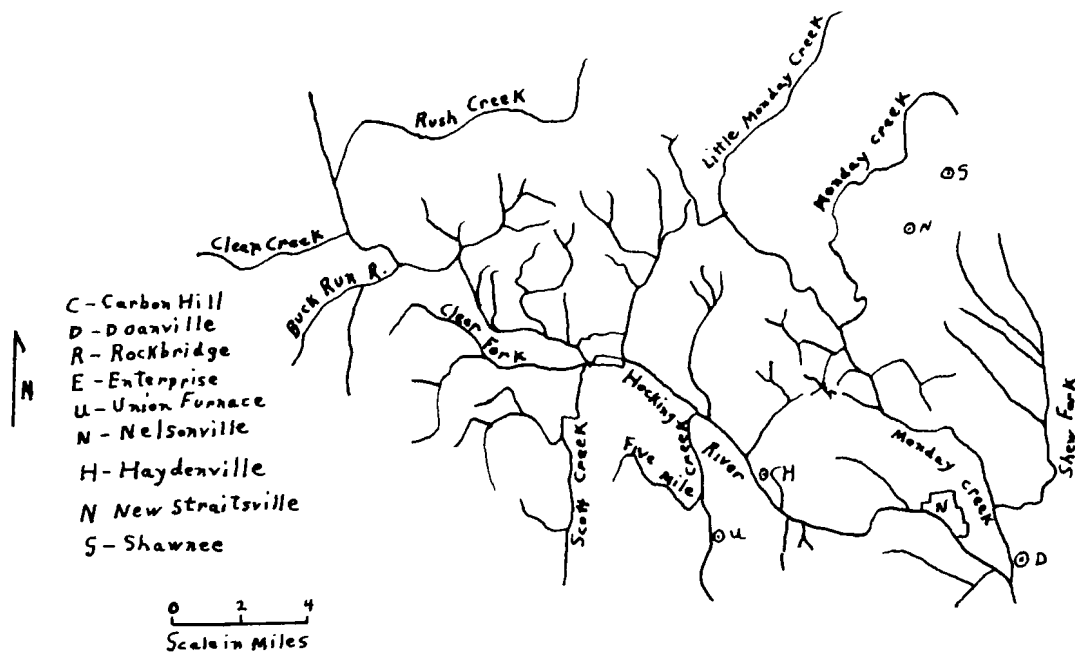
74.4 Turn right on gravel road.



**Fig-9 Pre-Illinoian Drainage of Northeast Hocking County
(From Merrill)**



Drainage In The Hocking Valley Immediately Before Illinoian (From Merrill)



Modern Drainage In The Hocking Valley

Fig.10 Illinoian Drainage Changes In The Hocking Valley

74.5

STOP #9 Indian Mound, The Plains

This is another abandoned segment of the Illinoian valley train, the largest Pleistocene deposit in Athens County. The surface, about 50 to 60 feet above the Hocking River, is up to one mile to the southwest of the modern floodplain. The Plains is about $2\frac{1}{2}$ miles long and from one-half to one mile wide. The depth of fill is variable, but in places is greater than 115 feet. The valley surface is about 24 feet lower in the center than at the sides, probably as a result of differential compaction. The northwest end has an elevation of 728 feet, the southeast end 711 feet. The fill consists of lenticular gravel, sand, and silt, underlain by 18 feet of brown sand with a few small pebbles, with coarse calcareous gravel beneath.

This segment of the Illinoian valley train was abandoned during the Illinoian stage for probably much the same reason as the segment from Rockbridge to Logan. Thick aggradation by Illinoian meltwater streams probably overtopped the low divide separating the Hocking River Valley from a small tributary of Sunday Creek. The river was following this path when the stream began once again to erode, and the lower few miles of Sunday Creek became a permanent part of the Hocking River.

The Plains, a village with a population of about 1800, is one of only two communities in Athens County which are growing. Water, which is supplied by private wells, has become increasingly scarce. Ground-water shortages have been reported in the past ten years. Many shallow wells have gone dry, and new wells, which averaged 50 feet in depth between 1952 and 1956, were drilled to an average depth of 85 feet between 1956 and 1960 (Stein, 1960). The water shortage, which exists in spite of a high general permeability, exists for the following reasons.

- 1) Increased need for water
- 2) The ground-water reservoir is small, and the gravel surface area offers a limited potential for ground-water recharge. The bedrock is generally too impermeable either to supply much water itself or to lend much recharge to the gravels and sands.
- 3) There are no surface streams from which recharge may be induced.
- 4) The Illinoian sands and gravels are open at both ends of the Plains, providing natural discharge into the lower Hocking Valley. This condition was aggravated, when in 1958 a roadcut for Route 33 bit into the northern end of the Plains, dewatering a spring and at least one well.

Return to Rte 682

- 74.6 Turn right on Rte 682
- 74.6 to 75.7 On the Plains.
- 76.0 Slater's sand and gravel pit on left is developed in a small Illinoian terrace remnant.
- 76.6 Zion Church. On the skyline to the southwest can be seen another remnant of Chauncey Creek.
- 77.6 to 78.0 Lancaster lacustrine terrace on right.
- 78.0 Leave terrace and cross Baltimore and Ohio Railroad tracks.
- 78.1 Cross Margaret Creek
- 78.4 Turn right on Rte 56.
- 78.7 STOP #10 Wisconsin lacustrine terrace.

The silts and clays of the Wisconsin lacustrine terrace are exposed in a cut on the lower side of the highway. The soil is not well exposed here, but about halfway down the slope is a thin marly lense containing several species of lacustrine fossils listed below, identified by James Murphy.

Sphaerium occidentale Prime
Volvota sincera Say
Volvota trincarinata Say
Stagnicola palustris elodes Say
Hendersonia occulta Say
Stenotrema monodon Rackett

Sphaerium is a pelecypod; the rest are gastropods. The fossils indicate a small pond with still water. Hendersonia has been found extensively in loess deposits and has never before been described in Ohio.

Above the highway is the White's Mill section, a road cut into bedrock. The following section has been simplified from Sturgeon (1958, p. 368-369)

<u>Series</u>	<u>Cyclothem</u>	<u>Member</u>	<u>Description</u>	<u>Thickness</u> <u>ft. inches</u>	
Conemaugh	Upper Brush Creek	Upper Brush Creek	Sandstone, light gray to yellowish-brown, fine shaly in lower part, more massive near top.	25	0

<u>Series</u>	<u>Cyclothem</u>	<u>Member</u>	<u>Description</u>	<u>Thickness</u> <u>ft. inches</u>	
Lower Brush Creek		Lower Brush Creek	Shale, medium gray	6	8
			Shale, fossiliferous, marine medium gray	1	6
			Limestone, medium to dark gray impure, fossiliferous, marine	0	6
			Shale, dark-gray carbonaceous, fossil	0	3
			Coal	0	3
			Underclay, dark gray plastic	0	1
			Clay & shale	12	6

In February, 1965, rock broke loose along a joint and moved as a rockslide across Route 56. The joint surface is still visible.

Return east on Rte 56 toward Athens.

79.5

Alternate STOP Athens Well Field.

The city of Athens obtains its water entirely from wells in the outwash sands and gravels. The new well field is to the right; the old well field further north at the end of State Street. The older wells are north of White's Mill dam. Three to five feet of silt in the reservoir behind the dam have greatly reduced induced recharge through the river bed. Serious water shortages in the early 1960's resulted during the Spring and Fall months. The new wells have been placed above and below the dam and close to the river for maximum induced recharge.

The greatest single day's use of water was 2,740,000 gallons. The university uses nearly half the water. The old well field had a capacity during low river flow of 1.3 to 1.6 mgd. Present capacity is 2.8 mgd, which will be increased by a new well presently being installed.

The new wells are gravel packed with 60" outer diameter and 26" inner diameter. The alluvial fill averages about 50 feet, with 15 to 18 feet of silt, clay, and sand overlying permeable sand and gravel. The permeability was calculated as 1400 gpd/ft²; the transmissibility as 42,700 gpd/ft. Storage coefficient is between 0.15 and 0.20.

- 79.8 Climb onto Carroll Terrace. Higher Lancaster terrace to left contains cemetery. Indian Village remains (Late Prehistoric, Fort Ancient aspect) to the right at the edge of the Carroll Terrace.
- 80.3 Turn left from Union Street onto Court Street (Rtes 33 and 50).
- 80.6 Turn right onto Carpenter Street (Rte 50).
- 80.7 Turn left on State Street, following Rte 50 east.
- 90.7 Turn left onto Rte 329 into Guysville.
- 91.0 to 91.2 Illinoian terrace at left.
- 91.2 Wisconsin lacustrine terrace visible at the mouth of Miller Run several hundred yards to the left.
- 92.8 Enter Stewart. Illinoian and Carroll terraces exposed in Stewart.
- 92.9 Turn right onto Rte 144.
- 93.4 Cross Hocking River
- 93.8 Climb to top of Illinoian terrace.
- 94.3 Deep roadcut into Wisconsin lacustrine terrace.
- 95.4 Bridge crossing Hocking River to left. Continue on Route 144.
- 96.1 STOP #11 Roadcuts and gravel pits.

Two terrace levels are at this stop. The upper Illinoian valley train, preserved in a narrow abandoned channel, is the last large terrace remnant of its age to the southeast. It is exposed in a relatively new, shallow gravel pit, where the soil zone is well exposed, and in an older, much deeper gravel pit on the opposite side of the hill. The older pit may be reached by going through the barnyard (please be careful of the gates) or by traveling down the road and up a farm lane. The older pit exposes about 50 feet of gravel and sand. The deposit is calcareous from a

depth of 15 feet to the bottom of the pit and forms a series of striking cemented ledges. Blocks broken from the ledges are scattered along the lane. Kempton reports that little if any of the original depositional surface remains, although the surface above the newer gravel pit appears flat.

The lower terrace is lacustrine and of the same age as the Lancaster terrace system. A good weathering profile on the silts and clay can be seen at the road cut just below the farm house.

Return to Athens via Routes 144, 329, and 50.

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